HHS Public Access

Author manuscript

Pensam Educ. Author manuscript; available in PMC 2019 November 05.

Published in final edited form as:

Pensam Educ. 2018 ; 55(2): 1–17. doi:10.7764/PEL.55.2.2018.1.

The Development of English and Spanish Among Children in Immigrant Families in the United States

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Abstract

The variable language skills of children from immigrant families create challenges for families, teachers, and policy makers. A first step toward meeting those challenges is to understand the factors that influence language development in children who hear a language other than the country's majority language at home. We present findings from analyses of longitudinal data on children in immigrant families in the United States that contribute to that understanding. Our findings support four broad conclusions: (1) Children who are exposed to two languages simultaneously will lag behind monolingual children in their rates of single language growth. This is the normal result of distributed language exposure. (2) Language exposure provided by native speakers is more supportive of language growth than exposure provided by nonnative speakers. Therefore, immigrant parents should be encouraged to interact with their children in the language that allows the richest, most meaningful conversations, not necessarily in the majority language. (3) Preschool attendance does not always provide support for majority language skill. Attention needs to be paid to the quality of language support provided in preschool classrooms if they are to benefit language growth. (4) Acquiring the heritage language does not interfere with acquiring the majority language. Rather, it is heritage language acquisition that is vulnerable.

Resumen

Las habilidades variables del lenguaje en niños de familias inmigrantes crean desafíos para las familias, profesores y actores políticos. Un primer paso para acercarse a estos desafíos, es entender los factores que influencian el desarrollo de lenguaje en niños que escuchan un lenguaje distinto al del país de residencia en sus hogares. En este artículo presentamos hallazgos de análisis longitudinales sobre datos de niños de familias inmigrantes en los Estados Unidos que contribuye al entendimiento de estos desafíos. Nuestros hallazgos muestran cuatro grandes conclusiones: (1) Los niños que están expuestos a dos lenguajes simultáneamente presentan un desfase con respecto a los niños monolingües respecto a los índices de crecimiento de uno de los idiomas. Este es el resultado normal de una exposición al lenguaje de manera distribuida. (2) La exposición al lenguaje proporcionada por los hablantes nativos es de mayor apoyo al desarrollo del lenguaje que la exposición proporcionada por hablantes no-nativos. Es por eso, que los padres inmigrantes deben ser alentados a interactuar con sus hijos en el lenguaje que permita intercambios

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significativos y abundantes en conversaciones, no necesariamente en el idioma de la mayoría. (3) La asistencia a cursos preescolares no siempre ofrece apoyo hacia las habilidades del lenguaje. Se necesita prestar atención a la calidad del apoyo del lenguaje que se proporciona en las aulas del preescolar si estas presentan beneficios al desarrollo del lenguaje. (4) Adquirir el idioma heredado no interfiere con la adquisición del idioma mayoritario, más bien, la adquisición del idioma heredado es el que se encuentra vulnerable.

Keywords

heritage language; bilingualism; language acquisition

Keywords

lengua de herencia; bilingüalismo; adquisición del lenguaje

Teachers in Latin America have many children in their classrooms who come from homes in which a language other than Spanish (or Portuguese) is spoken. Some of these children hear an indigenous language, and some are children of immigrant parents and they hear their parents heritage language at home. Children who hear a language other than the majority language at home in their preschool years often enter school with limited skills in the language used for instruction. This creates challenges for both the children and their teachers. The purpose of this paper is to present data that will help teachers and families understand why children from language minority homes have different language skills than children who come from exclusively Spanish (or Portuguese)-speaking homes. The information should also help families support their children's development of school readiness skills and should assuage the fears of those who might worry that indigenous languages or the heritage languages of immigrants threaten the maintenance of Spanish (or Portuguese) as the majority language in Latin American countries.

The data to be presented come from multiple analyses of a longitudinal data base collected in South Florida, in the United States. South Florida has a large population of Spanish-speaking immigrants from countries in the Caribbean, South America, and Central America. Spanish is spoken widely and enjoys greater prestige than is often the case for the heritage language of immigrant groups (Eilers, Pearson, & Cobo-Lewis, 2006). However, English is still the majority language of the country and the language of instruction in school. This is the context in which the children in our study are developing two languages. The participants were 139 children raised in homes in which Spanish was spoken either exclusively or in combination with English and 39 children raised in monolingual English-speaking homes. The children's language environments and language development were assessed at 6-month intervals from the age of 2 ½ to 5 years. The analyses presented here address four specific questions:

(1) What are the effects of exposure divided between two languages on the rate of children's language growth?

(2) Does it matter whether children's language exposure is provided by a native speaker?

(3) Does attending preschool help children from minority language homes acquire the majority language?

(4) Does learning the minority (heritage) language interfere with learning the majority language?

The outline of this paper is as follows: First, we describe the method of the longitudinal study that produced the database from which all the following studies draw their data. Then, for each research question, we present the background, analyses, and findings. We conclude with a summary that returns to our original aim of contributing to understanding the development of majority and heritage languages in children of immigrant families.

Method

Participants

The participants were 178 children born in the United States and living in South Florida. One hundred and thirty-nine of the children (74 girls, 76 boys) lived in homes in which Spanish was spoken, either exclusively or in combination with English, and 39 of the children (20 girls, 19 boys) lived in English monolingual homes. In the Spanish-speaking homes, at least one parent was born in a Spanish speaking country. The most frequent native countries of the Spanish-speaking parents were Colombia, Peru, Venezuela, and Cuba. Additional countries of origin for parents in this sample were Argentina, Mexico, Dominican Republic, Chile, Ecuador, El Salvador, Guatemala, Nicaragua, Panama, Spain, and Uruguay. On average, the families in this study were relatively educated and affluent, which is not typical of immigrants world wide but is typical of Spanish-speaking immigrants in South Florida. Forty-seven percent of fathers and 57 percent of mothers in immigrant families had a college degree or higher. Among parents in the monolingual English-speaking homes, 72 percent of fathers and 77 percent of mothers had a college degree or higher.

All children were full term and healthy at birth, had normal hearing based on parental report of otoacoustic emissions testing at birth, and showed no sign of communicative delay at 30 months, based on the *Ages and Stages* screening instrument (Squires, Potter, & Bricker, 1999). Participants were recruited through advertisement in local magazines and at programs for parents with young children, as well as through word of mouth.

Procedure

The children's English and, where applicable, Spanish language skills were assessed when the children were 30 months old and every six months after that, up to the age of 60 months. The attrition rate from 30 to 60 months was 17.5%. There were additional missing data for some participants at each assessment point. At each assessment point, the primary caregiver was administered an extensive questionnaire in interview, and the children were administered multiple tests of their language skill, including recordings of spontaneous speech. These assessments took place in 1 to 2 ½ hour sessions per day over the course of four days for the bilingual children and over two days for the monolingual children. For the

bilingual children, assessments of English and Spanish were conducted on different days in counterbalanced order. Assessments and interviews occurred in the participants' homes or in a university play space, depending on the participants' preference.

Instruments and Measures

Home Language Environment Questionnaire.—This 78-item questionnaire was administered to each child's primary caregiver in an interview that lasted between 20 and 30 minutes. The examiners were native Spanish speakers who were highly proficient in English. The interview was conducted in the language of the caregiver's choice. In the context of this interview, caregivers provided background information about who lives in the household, their native languages, and the languages they use with the target child. The caregivers also provided an overall estimate of the relative amount of English and Spanish the children heard at home. Previous research has suggested that such caregiver estimates are reliable and strongly related to bilingual children's language skill (Hoff, Core, Place, Rumiche, Señor & Parra, 2012; Place & Hoff, 2011).

Expressive One-Word Picture Vocabulary Test (EOWPVT).—The English monolingual children were administered *The Expressive One-Word Picture Vocabulary Test - EOWPVT* (Brownell, 2000) in English. The bilingual participants were administered the *EOWPVT – Spanish Bilingual Edition* (Brownell, 2001) once in English and a separate time in Spanish. This is an examiner administered standardized test in which participants view an image and are asked to provide a label. The bilingual version is an adaptation of the English test, created by excluding items that the developers found untranslatable or culturally biased. The standard administration of the bilingual version allows the child to label the picture in either language and yields a conceptual score. We modified this procedure to allow only English labels during the English assessment and only Spanish labels during Spanish assessment in order to attain separate assessments of the children's skills in each language, as have others (Anthony et al., 2009).

The MacArthur-Bates *Communicative Development Inventory- Words and Sentences* (*CDI*, Fenson et al., 2007) and the ***Inventario del Desarrollo de Habilidades Comunicativas- Palabras y Enunciados*** (*IDHC*, Jackson-Maldonado et al., 2003). These instruments are checklists in which caregivers report on the words and structures they have heard the child produce. The checklists were completed by those caregivers who were most familiar with the child's production in each language. These instruments are widely used in language development research and have high validity in bilingual populations (Fenson et al., 2007; Jackson-Maldonado et al., 2003; Marchman & Martínez-Sussman, 2002). The instruments yield a single vocabulary score and two measures of grammatical development used here: a grammatical complexity score and a measure of the mean length of the child's three longest utterances.

Research Question (1) What are the effects of exposure divided between two languages on the rate of children's language growth?

Background.

Children exposed to two languages must, on average, hear less of each language than children exposed to only one language. Thus, a very basic question about bilingual development concerns the effects of such divided language exposure. Strongly nativist theories of language acquisition, which explain language acquisition more as the result of an inborn "instinct" (Pinker, 2003) and less as result of language experience, predict minimal effects of divided exposure. In contrast, usage-based theories, which explain language acquisition as a result of general learning process operating on the information available in the speech children hear (Tomasello, 2015), predict that the amount of language exposure should have clear, observable effects on the rate of language development.

Although some early studies of small samples of bilingually developing children claimed that bilingual children develop in each of their languages at the same pace as monolingual children develop in their single language (Pearson, Fernández, & Oller, 1993; Petitto et al., 2001), subsequent research has not supported that claim (Hoff, 2015, 2018). One of the most robust findings in the study of early bilingual development is a relation between the quantity of children's exposure to each language and their levels of knowledge of each language. For example, Marchman and colleagues estimated the number of words per hour addressed to Spanish-English bilingual children in each language from extensive recordings made *via* small microphones the children wore. Quantity of language exposure accounted for 50 percent of the variance in the children's Spanish expressive vocabulary scores and 28 percent of the variance in the children's English expressive vocabulary scores (Marchman, Martínez, Hurtado, Grüter, & Fernald, 2017).

Many more studies have assessed quantity using parent-report estimates of relative quantity. While this is a second-best measure, it is not a bad measure. It is moderately to strongly correlated with word counts (Marchman et al., 2017) and strongly related to concurrently obtained diary records of time exposed to English and Spanish (Hoff et al., 2012). Most importantly, multiple studies have found that caregiver estimates of children's relative quantity of exposure to each language are significant predictors of bilingual children's skill levels in each language (Gathercole & Thomas, 2009; Hurtado, Grüter, Marchman, & Fernald, 2014; Pearson, Fernandez, Lewedeg, & Oller, 1997; Thordadottir, 2011, 2015). Relative exposure has been found to account for approximately 35% of the variance in vocabulary and grammatical skills (Hoff et al., 2012). Importantly, variations in input quantity make a difference throughout the range of variation. That is, 20% of input in a language has a different outcome that zero input, and 80% of input in a language has a different outcome than 100% of input. The evidence of some learning given only 20% of input comes from Hoff et al.'s study of children from Spanish-English bilingual homes (2012), which found that children who heard only 20% of their input in one of their languages, according to maternal report, nonetheless produce some words in that language at 22 months. The evidence that input reduced by even 20% is different from monolingual input comes from Deanda and colleagues' study of 16-month-old children exposed to

English and Spanish. They found for both languages that children who heard 80% of their input in that language had smaller comprehension vocabularies than children who heard 100% of their input in that language (Deanda, Arias-Trejo, Poulin-Dubois, Zesiger, & Friend, 2016). In sum, the evidence is strong that language growth is influenced by the quantity of language input and that when children's input is divided between two languages the children initially develop each language at a slower pace than monolingually developing children as a result.

This effect of quantity of exposure has been better documented in very young children than in children older than 3 years. An important question is when—or whether—children with less language exposure catch up to their monolingual peers. In the present analyses we directly compare growth curves in English for monolingual and bilingual children, and we investigate the effect of relative amount of exposure on growth in English and Spanish for bilingual children. These analyses largely make use of the same data reported in Ribot and Hoff (2017). However, in the present analyses we correct the measures of the monolingual children's vocabulary for the small differences that exist between the bilingual version of the EOWPVT, which was administered to the children from Spanish-speaking homes, and the monolingual English version of that instrument, which was administered to the children from monolingual English-speaking homes. The monolingual version has some pictures that are not presented in administering the test to Spanish-speaking children, for either linguistic or cultural reasons, and thus the monolingual children's scores could be inflated as a result. The two forms of the test diverge only at the 10-year-old level for bilinguals, but that is the 4-year-old level in the monolingual form and thus could make a difference in a study that includes measures through age 5. In the present data, we did not give monolingual children credit for knowing the labels of pictures that were not administered to the bilingual children.

Data and data analysis plan.

We analyzed the effect of the relative amount of English exposure in the home on children's growth in English and in Spanish from 30 to 60 months, controlling for parental education. Participants were those children from the larger study who had data at two or more assessment points and had at least 10% home exposure to English at 30 months. These selection criteria yielded a sample of 39 monolinguals (20 girls, 19 boys) and 112 bilingually developing children (56 girls, 56 boys). In these multilevel models, maternal and paternal years of education were averaged and centered at 10 years yielding a single education control variable ranging from 0 (less than high school) to 8 (graduate degree). Each model included age, parental education as a time invariant covariate, and relative English exposure as a time varying covariate. The quadratic effect of age and language exposure, as well as all potential interactions were added to the models independently. In all analyses, missing data was handled using maximum likelihood estimation and models were computed with unstructured covariance structure.

Results.

Means and standard deviations for the raw English and Spanish expressive vocabulary scores at each time point are presented in Table 1. The final English and Spanish models are presented in Table 2. The relative amount exposure was a significant positive predictor of

English and Spanish vocabulary scores. In addition, there was a significant quadratic relation between amount of exposure and vocabulary size in English. Figure 1 illustrates the effect of exposure on English growth by plotting the estimated growth curves for children with 100%, 75%, 50%, and 25% English input levels, while controlling for the effect of education. The significant quadratic effect of English exposure is reflected in the increasing distance between the growth curves as the relative quantity of exposure increases by equal amounts. Figure 2 illustrates the effect of exposure on Spanish vocabulary growth by plotting the estimated growth curve models for children with 75%, 50%, and 25% Spanish input levels, while controlling for the effect of education.

Discussion.

The results of this analysis are consistent with the large body of data on younger bilingual children in showing that children with bilingual exposure lag behind monolingual children by 6 months to 1 year in their acquisition of English expressive vocabulary, with the size of the lag depending on how much of the children's language exposure was in English. This effect of dual language exposure is separate from any additional effect of low levels of parental education and poverty that may affect bilingual homes. Furthermore, in the developmental period covered by these data, we find persistent effects of differences in the quantity of language exposure. The gap in language skills associated with differences in language experience do not close by age 5.

The quadratic effect of exposure on English, but not Spanish, is consistent with findings that language exposure from native speakers is more supportive of language development than exposure provided by nonnative speakers. In this sample, the households that provided higher levels of English exposure were frequently also households in which one parent was a native English speaker, and in the monolingual households almost always both parents were native English speakers. The lack of any quadratic effect of exposure on Spanish is consistent with the finding from other analyses that virtually all of the children's exposure to Spanish was provided by native Spanish speakers, even in households where only one parent was a native Spanish speaker (Place & Hoff, 2011, 2016).

There are two important caveats in using these findings as the basis for expectations about the language skills of children from immigrant families. One is that the predictions illustrated in Figure 1 are based on a model in which the level of majority language exposure stays constant, albeit at different levels, throughout the period. Typically, that is not the case. Typically, exposure to the majority language and majority language dominance increase even during the preschool period. Second, the models are based on data from children who all had some exposure to both languages from infancy. Other evidence suggests that accelerated growth occurs when children's first exposure is later (Snedeker, Geren & Shafto, 2007), as often happens with children of immigrant parents. These limitations notwithstanding, the findings from these analyses make the important point that children who hear the majority language less than monolingual children do can be expected to have lower levels of skill in that language. That is a natural consequence of the dependence of language acquisition on input.

Another finding evident in these figures is that children acquire English at a faster rate than they acquire Spanish, given the same levels of English and Spanish exposure at home. The reasons for this deserve further exploration. It may be that some of the discrepancy arises from mothers' underestimating how much they use English at home. Another likely reason is that children hear English in greater proportion outside the home. We also have evidence of another factor at work, and that is the children's preference to speak English over Spanish. In other analyses of these data, we have found that children often speak English to their parents, even when their parents speak Spanish to them (Ribot & Hoff, 2014). We also find that children who do this show greater growth in English expressive vocabulary than children who do not (Ribot, Hoff, & Burridge, 2018). We suggested that this preference to use the majority language, combined with the effect of use on expressive language skill, might contribute to explaining why these—and many other children from language minority homes—have stronger receptive skills in the minority language than expressive skills. In the extreme, many children from language minority homes grow up to be passive bilinguals, able to understand two languages but comfortable speaking only one.

Research Question (2) Does it matter whether children's language exposure is provided by a native speaker?

Background.

If, as usage-based theory argues, language acquisition is the result of children's analysis of the data provided in the speech they hear, then not only the quantity, but also the quality of those data should matter. One fact about the language environment of children in immigrant families and communities is that much of their exposure to the majority language comes from people who are not native speakers of that language (Place & Hoff, 2011, 2016). On average, non-native speakers are likely to be less proficient in the language than native speakers. There is evidence that the proficiency of the adult nonnative speakers who interact with children is a significant influence on the children's language development (Buac, Gross, & Kaushanskaya, 2014; Jia, Aaronson, & Wu, 2002) and that language exposure provided by native speakers is more supportive of language development than exposure provided by nonnative speakers. In fact, as already discussed, the quadratic effect of the amount exposure to English on English vocabulary may reflect a particular benefit of input from native speakers.

Other findings in the literature also point to a specific benefit of exposure to speech from native speakers. Among child immigrants to English-speaking Canada, parents' use of English at home did not predict the children's acquisition of English while exposure to native speakers did (Paradis, 2011). In a previous study of Spanish-English bilingual children in the U.S., we found that the proportion of children's English input provided by native speakers was a positive predictor of the children English skill, even holding the amount of English exposure constant (Place & Hoff, 2011). This effect was partially replicated in the present sample (Place & Hoff, 2016).

In the present analyses we seek to replicate two other previous findings that also suggest a unique benefit of native speaker input. In a previously studied sample, we found that

Spanish-English bilingual children with a native English-speaking parent had larger English vocabularies than children whose parents were both native Spanish speakers, even after effects of the amount of English input were statistically removed (Place & Hoff, 2011). We also found that the correlation between English exposure at home and children's English vocabulary scores was significant only in homes in which one parent was a native speaker of English (Hoff et al., 2014). The first finding was based on analysis of children's vocabulary at 25 months of age; the second based on analysis of their vocabulary at 4 years. Here we replicate those analyses in a new sample of 4-year-old children drawn from the larger longitudinal study.

Data and data analysis plan.

We selected only those families who met a strict definition of having two native Spanish speaking parents or having one native English and one native Spanish speaking parent. A native English speaker was defined as someone who described himself or herself as a native speaker and was born in the U.S. or had an age of arrival in the U.S. as younger than 5 years. A native Spanish speaker was someone who described himself or herself as a native Spanish speaker, was born in a Spanish speaking country, and had an age of arrival in the U.S. older than 8 years. These selection criteria yielded a sample of 94 children (50 girls, 44 boys) with two native Spanish speaking parents and 33 children (17 girls, 16 boys) with one native English and one native Spanish speaking parent, all of whom had complete data at the 4 year assessment. The purposes of the data analyses were to ask (1) whether a unique benefit of having a native English-speaking parent was observable, over and above the influence of the quantity of English exposure provided, and (2) whether the benefit of English exposure to children's English development was greater in households with a native English-speaking parent.

Results.

Mean English and Spanish vocabulary scores for each group are plotted in Figure 3. The children with a native English-speaking parent had higher English vocabulary scores than the children with two native Spanish-speaking parents ($t(87) = 4.28$, $p < .001$), while their Spanish scores were not significantly different from the Spanish scores of the children with two native Spanish speaking parents. Also, the children with a native English-speaking parent heard more English at home ($M = 49.59\%$, $SD = 24.14$) than the children with two native Spanish-speaking parents ($M = 23.42\%$, $SD = 21.76$) ($t(90) = 5.09$, $p < .001$).

To ask whether there was a unique effect of having a native English-speaking parent on English growth, over and above the effect of increased English exposure, one-way analysis of covariance was calculated comparing the two groups of children with amount of English exposure as a covariate. After statistically removing the differences attributable to home English exposure, the English vocabulary scores of bilingual children who had a native English speaking parent were still significantly higher than the English vocabulary scores of bilingual children with two native Spanish speaking parents, $F(1,86) = 5.99$, $p = .016$, $\eta_p^2 = .065$.

The final analysis asked whether the correlation between English exposure at home and English vocabulary was moderated by parents' language backgrounds. It was not. The zero order correlations between English use at home and children's English vocabulary scores in homes with a native English- speaking parent was $r(26) = .413$, $p < .05$, two tailed. For children in homes with two native Spanish speaking parents it was $r(63) = .298$, $p < .05$ two-tailed. Those correlations are not significantly different.

Discussion.

The results of the present analyses replicate the previous finding in Hoff et al. (2014), that children with a native English-speaking parent enjoy an advantage in English vocabulary growth compared to children with no native English speaker at home, and that advantage cannot be fully explained by differences in the quantity of English exposure the children receive. However, the present data do not tell us what the source of the extra advantage is. The relative amount of English exposure at home accounted for 17% of the variance in children's English vocabulary scores among children with a native English-speaking parent and only 9% of the variance among children with no native English-speaking parent. The direction of the difference between these effect sizes is consistent with the hypothesis that native speaker input is more useful to the language learning child, but difference is not statistically significant. At present we can conclude only that children with a native English-speaking parent have stronger English skills for reasons not fully explained by the effects of the quantity of the exposure to English at home.

Research Question (3) Does attending preschool help children from minority language homes acquire the majority language?

Background.

Preschool seems a logical place for children from minority language homes to gain early exposure to the majority language and to experience increased growth in that language as a result. However, the literature on the benefits of preschool is mixed. Language exposure in school settings can benefit bilingual children's language growth in both their languages (Gámez, 2015; Gámez & Levine, 2013; Winsler, Diaz, Espinosa, & Rodriguez, 1997), but the quality of preschool appears to be important to preschool fulfilling that potential (Burchinal, Zaslow, & Tarullo, 2016). One recent large-scale study found no relation between immigrant children's preschool attendance and their majority language skill (Floccia et al., 2018). Thus, the effect of preschool on children's bilingual profiles is an open question. In the present study we ask whether children's history of preschool attendance is related to their English or Spanish skills at 4 ½ years of age—an age just prior to beginning formal schooling for all children in the U.S. In the South Florida, preschools with a bilingual curriculum are rare. Although teachers and teachers' aides of are Spanish speakers and use Spanish for behavioral management, the language of curriculum delivery is English. Thus, if preschool-based English exposure benefits English language development, we should see its effect in our sample.

Data and data analysis plan.

The children selected were all the children from Spanish-speaking homes who were assessed at 4 ½ years and who had less than 75% English exposure at home. We hypothesized that preschool was most likely to have an observable effect on the English skills of children with less English exposure, thus we excluded those children whose home exposure was 75% or more in English. This yielded a sample of 119 bilingual participants (62 girls, 57 boys) which we divided into two groups, those with less than 25% English exposure (n = 57; *M* exposure = 13.85, *SD* = 9.87) and those with 26% to 75% English exposure (n = 62; *M* exposure = 53.86, *SD* = 18.40). We categorized the children as Early Starters (n = 44) if they were already attending preschool at 30 months, as Late Starters (n = 47) if they began preschool between 30 and 54 months, or as never having attended preschool (n = 28).

Results.

Mean levels of English and Spanish EOWPVT scores for each group are plotted in Figure 4. Separate 3 (Preschool Starting Age) × 2 (Home English Use) ANOVAs were conducted with English and Spanish vocabulary size as outcomes. For English as the outcome measure, there was a significant positive effect of Home English Use, $F(1, 113) = 20.59$, $p < .001$, $\eta_p^2 = .154$. There was no significant effect of Preschool Starting Age ($F(2, 113) = 0.447$, $p = .640$), and no Preschool Starting Age × Home English Use interaction ($F(2, 113) = 0.351$, $p = .705$). The same pattern of results was found for Spanish skill. Children who heard more Spanish at home had significantly higher levels of Spanish skill than those who heard less, $F(1, 112) = 19.29$, $p < .001$, $\eta_p^2 = .147$. The age at which children began preschool was not related to Spanish vocabulary skill ($F(2, 112) = 1.146$, $p = .322$), nor was there a significant interaction between preschool starting age and Spanish exposure on Spanish vocabulary ($F(2, 112) = .287$, $p = .751$).

We further pursued the hypothesis that preschool experience benefitted English language development for children from Spanish-speaking homes by testing for an effect of whether children attended full-time (n = 54), part-time (n = 37), or not at all (n = 28), with similar results. The balance of English and Spanish heard at home was significantly related to children's English and Spanish vocabulary scores, as in the previous analyses. There was no effect of time spent in preschool and no interaction between home language exposure and time spent in preschool.

Discussion.

The failure to find any effect of preschool attendance on children's majority language skill—even though the preschools were officially English-using schools--is a warning that early education programs are not an automatic solution to how to prepare children from immigrant families for schooling in the majority language. We do not have data on the nature of the children's language experience inside their preschool classrooms. We do know that many of preschool teachers were not native English speakers, and it is likely that many of the other children in the preschools had limited English skills. Although there are demonstrations that high-quality preschools can benefit children's language development and that high quality bilingual preschools can benefit bilingual development, the findings from this study suggest that many preschools do not live up to that potential.

Research Question (4) Does learning the minority (heritage) language interfere with learning the majority language?

Background.

The question we ask here is whether young bilingual children's knowledge of one language affects their growth of knowledge in the other language. In the literature one can find arguments for expecting positive relations and arguments for expecting negative relations. The positive relation argument is that there is transfer of knowledge acquired in one language to the other. There are clear examples in second language acquisition that knowing something in one language helps the acquisition of that skill or construct in the other. For example, children whose first language marks tense are faster at learning to mark tense in English than children whose first language does not mark tense (Paradis, 2011), and both narrative and other literacy-related skills acquired in one language benefit the acquisition of literacy in a second (Durgunoğlu, 2002; Paradis & Kirova, 2014). The argument for expecting negative relations is that as skill in one language grows it takes over the other because increasing proficiency leads to increased use. Increased use, in turn, invites more input, which leads to more proficiency in a self-reinforcing spiral (Pearson, 2007).

In a previous analysis of data from our longitudinal study, we found unexpected evidence of a negative relation—of English taking over Spanish (Hoff, Quinn, & Giguere, 2017). That previous analysis was designed to test a hypothesis about the relations between vocabulary and grammar in development, and to do so we compared the relation between children's vocabulary size and level of grammatical development, calculated within English and within Spanish, to the relation of vocabulary size in English to grammatical development in Spanish, and vice versa. The cross-language correlations were essentially control conditions because there was no reason to think that vocabulary knowledge in English should influence grammatical development in Spanish, or vice versa.

Contrary to expectations, we did find cross-language relations. We found a negative relation between children's skill in English vocabulary and their subsequent growth in Spanish grammar, and we found a negative relation between children's skill in Spanish vocabulary and their subsequent growth in English grammar. We interpreted these findings as reflecting a general relation between English skill and Spanish language development among Spanish-English bilingually developing children in the U.S. To wit, we argued that as children become more skillful in English they use Spanish less and therefore acquire Spanish at a slower rate. The converse does not hold. There was no negative effect of children's level of Spanish vocabulary or grammar on their subsequent growth in English. The weakness in the evidence for that argument is that we did not test relations within domains where positive transfer is arguably more likely. For example, learning words in one language might prompt the search for words that label the same concept in the other, and in the domain of grammar, learning to mark a meaning (such as past or plural) might increase attention to how such a meaning is marked in the other language.

In the present analyses we investigated the relations over time between English and Spanish within linguistic domains. We asked whether English vocabulary skill helps, hurts, or has no

relation to the development of Spanish vocabulary, and vice versa. We also asked whether English grammatical development helps, hurts, or has no relation to the subsequent development Spanish grammar, and vice versa.

Data and data analysis plan.

The participants were the children from Spanish-speaking homes in the larger study who met the criteria that they were producing words in both English and Spanish at 30 months and that there was a family member able to complete the MacArthur-Bates inventory for each language. The participants were 90 (49 female, 41 male) Spanish-English bilingual children (49 female, 41 male). The measures included two assessments each of vocabulary and grammar. The vocabulary assessments included the MacArthur-Bates inventories in each language and the *Expressive One Word Picture Vocabulary Test*, also administered in each language. The grammar assessments included two measures from the MacArthur-Bates inventory—the mean length of the longest 3 utterances the child had produced and the grammatical complexity score. In these analyses, caregiver estimates of each child's relative exposure to Spanish at 30 months was entered as a covariate so that the tradeoffs in relative exposure combined with the influence of relative exposure on language growth did not result in spurious negative relations across languages. (The mean levels of relative exposure were fairly constant across time and individual differences were stable: pairwise correlations between adjacent time points were all significant and ranged from .65 to .81).

The statistical method employed was bivariate latent change score modeling (LCS modeling), which allowed for simultaneous modeling of growth in two domains and testing the co-development between those domains over time (for a review, see McArdle, 2009). In essence, LCS modeling allows us to ask whether skills in one language influence subsequent development in the other, are influenced by prior development in the other, or are independent of development in the other. The details of the statistical approach are available in Hoff et al. (2017). Observed scores across the eight measures were converted to developmental z-scores to improve interpretation of the models. By using the means and standard deviations from the first time point, the scaling of the latent change scores becomes interpretable as the standardized unit change relative to first time point variance.

Model fit was assessed using the chi-squared (χ^2) test of model fit statistic, the root mean squared error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker-Lewis Index (TLI). Nested models were compared using a chi-squared difference test; non-nested models were compared using the Bayesian information criteria (BIC) (Raftery, 1995). We fit and compared four competing models to the vocabulary data and to the grammar data: 1) English predicted growth in Spanish, 2) Spanish predicted growth in English, 3) both languages predicted growth in the other language, 4) there were no cross-language influences, but growth in both languages was correlated.

Results.

The best fitting model of the cross-language relations in vocabulary development was a model in which English vocabulary was a leading negative indicator of Spanish vocabulary (χ^2 (129) = 207.592, $p < .0001$; CFI = .932, TLI = .929, RMSEA = .082 [90% CI .076, .

115]; BIC = 2444.918). That is, for the two intervals where this relation was significant, children's vocabulary level in English was a negative predictor of their growth in Spanish vocabulary over the subsequent six-month period. Parameter estimates for this model are included in Figure 5. What the model shows is that Spanish language input is a significant negative predictor of English vocabulary and a significant positive predictor of Spanish vocabulary at 30 months of age. English vocabulary at 30 months is a significant negative leading indicator of change in Spanish vocabulary from 30 to 36 months, indicating that children with better vocabulary knowledge in English grow less in Spanish vocabulary. This effect is not significant from 36 to 42 months; however, English vocabulary is again a significant negative predictor of Spanish vocabulary growth from 42 to 48 months of age.

The best fitting model of the cross-language relations in grammatical development was also a model in which English skill level was a leading negative indicator of Spanish skill level growth χ^2 (128) = 167.947, p = .0103; CFI = .956, TLI = .953, RMSEA = .059 [90% CI . 030, .082]; BIC = 2646.134. As was the case for vocabulary, home language input predicted skill levels at 30 months in the expected direction. For every subsequent time point in the data, children's level of grammatical development in English was a significant negative predictor of their growth in Spanish grammar over the following six-month period. Parameter estimates for this model are included in Figure 6.

Discussion.

When children are simultaneously acquiring two languages, it is possible that acquisitions in one language might benefit similar acquisitions in the other. We found no evidence of such relations in the present day, but the time lag was long. It is entirely possible that positive transfer occurs on a much smaller time scale. A different cross-language influence appears in the present data: As children learn the majority language, their rate of acquisition of the minority language slows. This finding holds across vocabulary and grammar. It cannot be evidence of some internal constraint on the acquisition of two languages because it is asymmetrical. English skill interferes with the acquisition of Spanish, while Spanish skill has no relation to subsequent growth in English.

General Discussion and Conclusions

The results of the several analyses presented here should help teachers and families understand why children who hear a minority language at home have different language skills than children who hear only the majority language. This is the circumstance both of children who hear an indigenous language and children of immigrant who hear their parents' native language. The findings also have implications for how families might support their children's development of school readiness skills. Children learn language as a result of being exposed to it and using it. If children's experience with language is divided across two languages, they will have less experience with each language than they would if their language experience were entirely in one language. As a result, all other things being equal, their initial rates of language development will be slower than the rate of language development in children learning only one language. This is not necessarily a bad outcome. Being able to speak two languages is a good skill to have for many reasons—even if it takes

a little longer to achieve than skill in only one language. And bilingualism in the majority language and the language spoken by parents and grandparents gives children a way to benefit from interactions with their whole family and gives them a connection to their cultural heritage.

Another reason that children from families who use a minority language may lag in their majority language skills is that much of the majority language exposure they receive is from people who are not native speakers. Although one might think that talking to small children does not demand high levels of language proficiency, the data are clear that exposure provided by highly proficient speakers is more supportive of language acquisition than exposure provided by less proficient speakers.

That conclusion leads to the question of how families can support their children's development of the majority language to improve their school readiness. Clearly telling parents to speak the majority language will have minimal benefits to their children's language development if the parents have limited proficiency themselves. It would be better for parents to interact with their children in the language that they are most comfortable using and for children to participate in activities that provide them contact with native monolingual speakers of the majority language. High quality preschools could be such an environment, but where preschool quality is variable, preschool is not reliably associated with improved majority language skills.

The results of our research also make it clear that minority language acquisition does not threaten the maintenance of Spanish (or Portuguese) as the majority language in Latin American countries. To the contrary, the growth curves for English and Spanish among children in South Florida make it clear that majority language acquisition is robust and heritage language acquisition is vulnerable. Even more specific evidence is provided by the analysis of change scores, which shows that majority language skills have a negative effect on minority language growth, but that minority language skills do not interfere with children's growth of skills in majority language. Because of its status as an internationally used language, English may be more likely to overwhelm heritage languages than are other majority languages. However, our data are consistent with data from other countries: minority languages that are used primarily at home and are not official languages of school or business are languages that are vulnerable (Gathercole & Thomas, 2009). Almost all the children in our study have acceptable levels of English skill by the age of 5 years. Most have significantly lower levels of Spanish skill.

The data presented hear come from studies of children in immigrant families who hear their parents' heritage language at home. The findings should also be relevant to children who hear an indigenous language at home. Children from both environments come to school with different language skills than children from monolingual, majority language homes. Their early language experience and language development has been distributed across two languages—or concentrated in the minority language. Many will need more time and extra support in order to acquire the majority language skills that schooling requires, but the children's acquisition of their family's language poses no threat to their acquisition of the national, majority language.

Acknowledgments

Paper prepared for a special section on language and education in *Pensamiento Educativo, Journal of Latin-American Educational Research*. This research was supported by the United States Eunice Kennedy Shriver National Institute of Child Health and Human Development Grant HD068421 to Erika Hoff.

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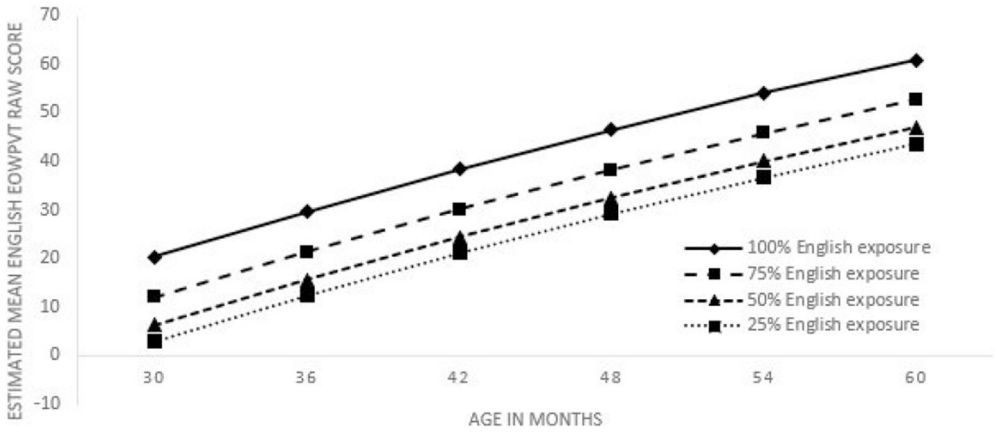

Figure 1.

Estimated trajectories of English vocabulary growth from 30 to 60 months at different levels of English exposure, controlling for parent education (n = 151). Estimated scores were based on the following formula: $EOWPVT\_English_{it} = 2.24 + 9.68(Age) + -0.02(English\ exposure) + -0.31\ (Age)^2 + 0.002(English\ exposure)^2$.

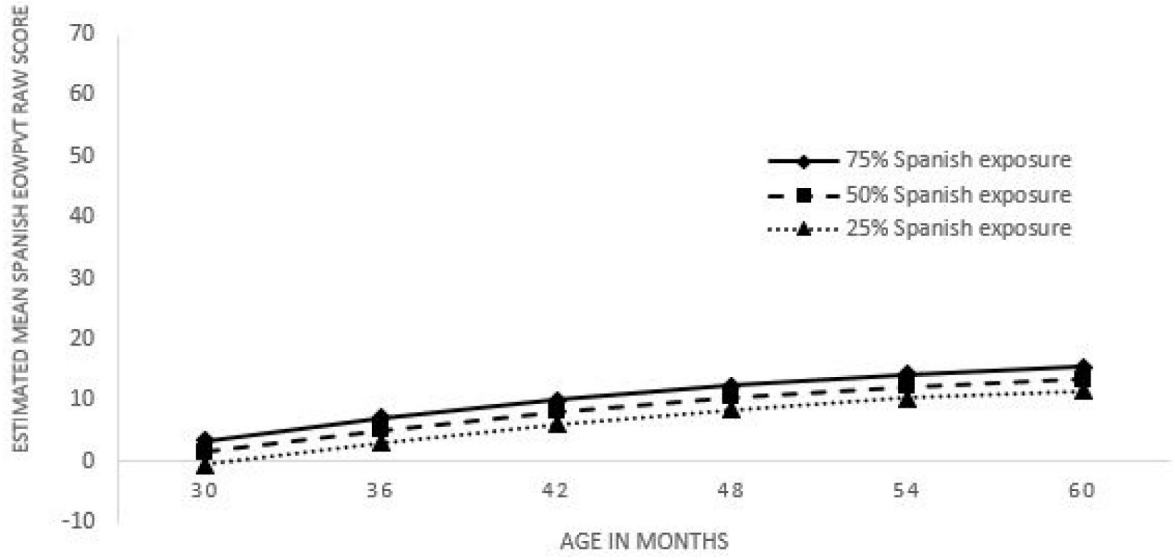

Figure 2.

Estimated trajectories of Spanish vocabulary growth from 30 to 60 months at different levels of Spanish exposure, controlling for parent education (n = 112). Estimated scores were based on the following formula: $\text{EOWPVT\_Spanish}_{it} = -2.53 + 3.91(\text{Age}) + 0.08(\text{Spanish exposure}) + -0.30(\text{Age})^2$.

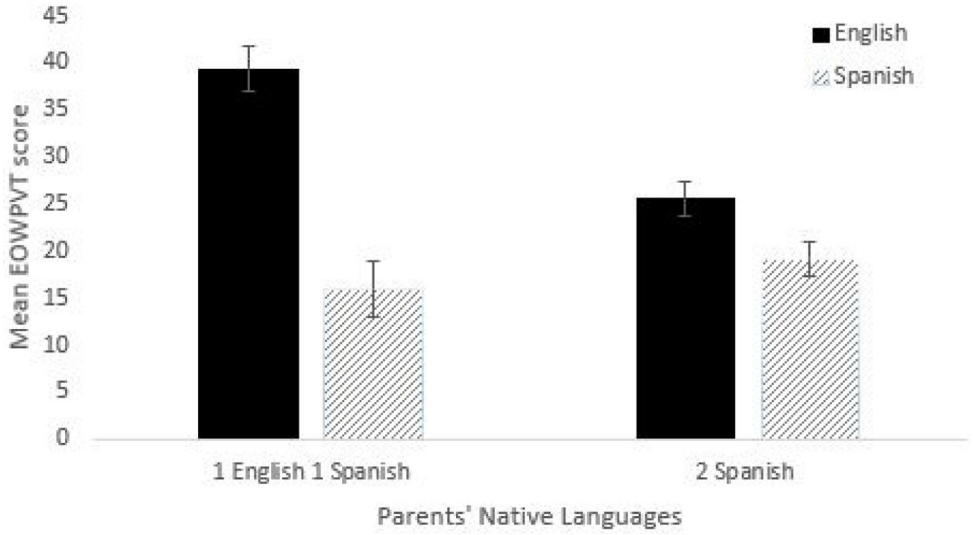

Figure 3.

Mean expressive vocabulary scores in English and Spanish for 4-year-old children from Spanish-speaking homes with one native English and one native Spanish-speaking parent (n = 33) or with two native Spanish-speaking parents (n = 94).

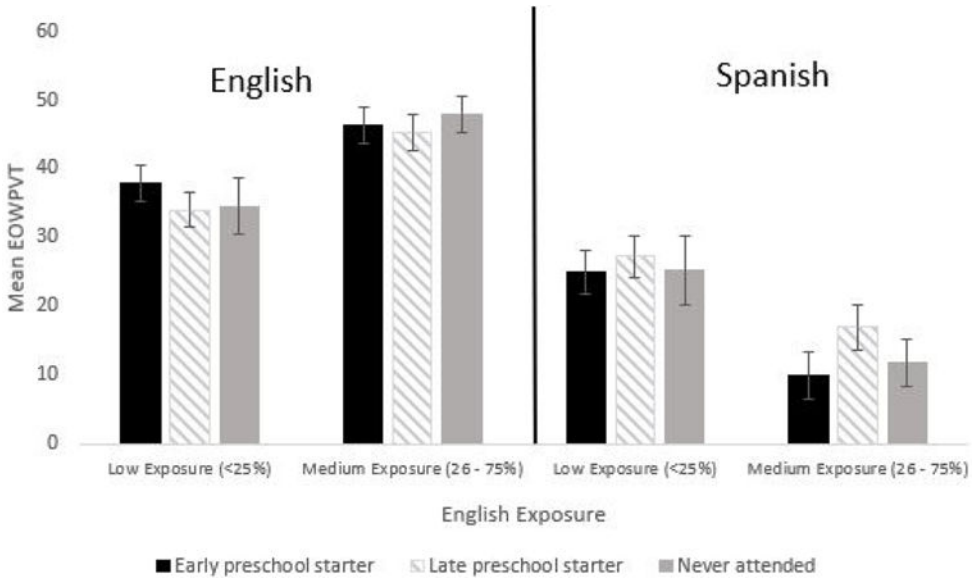

Figure 4.

Mean English and Spanish expressive vocabulary scores in 4 ½ -year-old Spanish-English bilingual children as a function of English exposure at home and preschool attendance history. Only home language exposure has a significant effect.

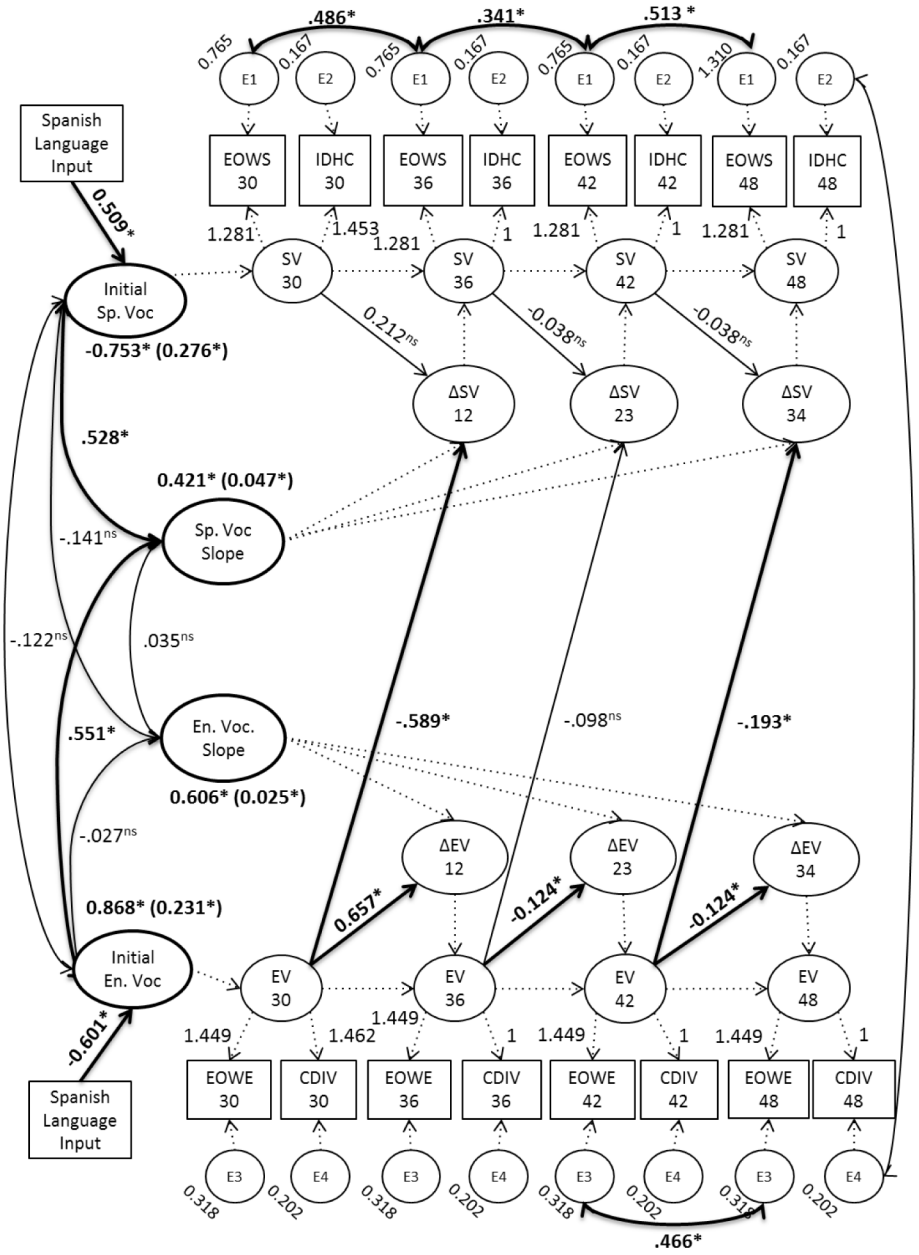

Figure 5.

Bivariate latent change score model of the relation between English and Spanish vocabulary over the period from 30 to 48 months of age, with level of input as a covariate. Pathways with a dotted line indicate a constraint (1) for model estimation. Bold pathways indicate significance. * = $p < .01$

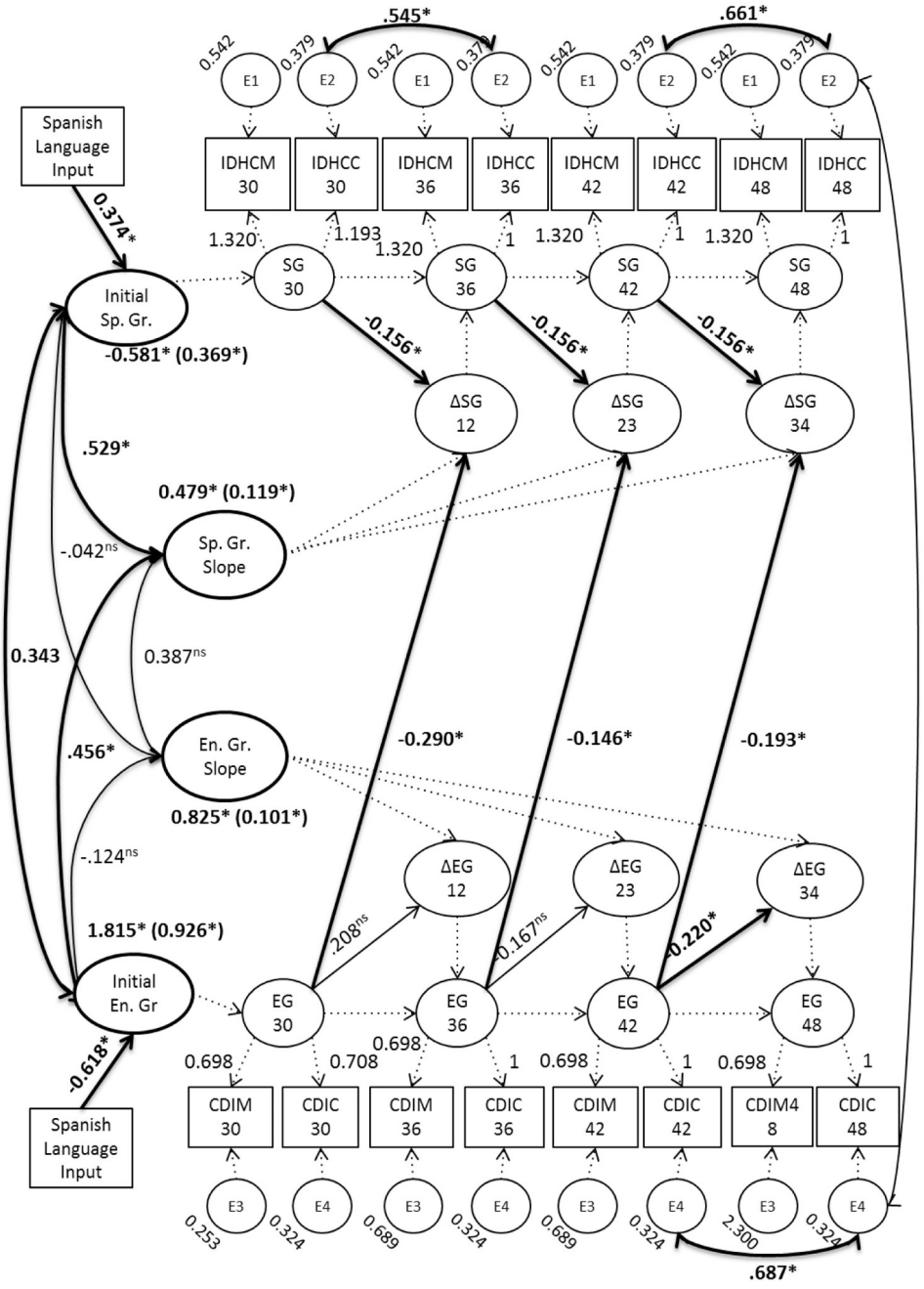

Figure 6.

Bivariate latent change score model of the relation between English and Spanish grammar over the period from 30 to 48 months of age, with level of input as a covariate. Pathways with a dotted line indicate a constraint (1) for model estimation. Bold pathways indicate significance. * = $p < .01$

Table 1

Observed means (and SD) for English and Spanish expressive vocabulary raw scores, as measured by the EOWPVT (N = 151)

	Child Age (months)					
Groups	**30**	**36**	**42**	**48**	**54**	**60**
Monolingual children						
English vocabulary						
Mean	26.39	38.50	46.72	53.87	60.37	67.21
(SD)	(8.80)	(9.36)	(9.14)	(10.54)	(11.94)	(8.64)
n	36	36	32	30	30	29
Bilingual children						
English vocabulary						
Mean	9.61	19.10	28.14	35.60	44.32	51.76
(SD)	(9.89)	(13.63)	(14.15)	(13.21)	(12.30)	(11.29)
n	110	62	78	88	99	107
Spanish vocabulary						
Mean	4.94	9.61	12.85	13.68	15.22	17.09
(SD)	(7.40)	(10.51)	(12.77)	(13.38)	(14.88)	(16.29)
n	112	66	82	92	101	105

Table 2

Estimates of fixed effects (and SEs) for English expressive vocabulary for monolingual and bilingual children (N=151) and for Spanish expressive vocabulary for bilingual children (n = 112)*

Predictor	γ	SE	*P*
English expressive vocabulary model (N = 151)			
Intercept	2.24	2.58	.387
Parental education	1.08	0.43	.014
Child age	9.68	0.48	<.001
English exposure	−0.02	0.05	.689
Child age^2	−0.31	0.09	.001
English exposure^2	0.002	0.00	<.001
Spanish expressive vocabulary model (n = 112)			
Intercept	−2.53	2.20	.252
Parental education	0.67	0.39	.086
Child age	3.91	0.43	<.001
Spanish exposure	0.08	0.02	<.001
Child age^2	−0.30	0.07	<.001
Model fit indices	−2LL	AIC	df
English model	4999.98	5019.98	8
Spanish model	3603.55	3621.55	7

Note. *−2LL*, −2 log likelihood; *AIC*, Akaike information criterion; *df*, Degrees of freedom.

*All effects of final models reported are based on raw scores. Parental education was centered on 10 years of education (ie, less than high school degree = 0); age 0 = 30 months; 0% exposure = no English or Spanish exposure in the home.